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ABSTRACT

This doctoral research paper reviews the empirical literature examining intergenerational transmission of attachment styles. The relationship between adult caregivers' internal representations of attachment as measured by the Adult Attachment Interview and their infants' attachment status as measured by the Strange Situation procedure has been established across numerous studies. This paper examines the transmission gap, the means by which attachment is "passed down" from one generation to another. The paper explores maternal characteristics such as expectations about parenting; internal representations of oneself as caregiver, one's child, and their relationship; maternal sensitivity; and distress tolerance. Infant temperament is also taken into consideration. The paper further discusses environmental characteristics such as nonmaternal care, amount of physical contact with caregiver, the presence or arrival of a sibling, sleeping arrangements, and external stressors. Implications for clinical intervention with parent-infant dyads or at-risk individuals prior to the birth of an infant are then discussed. (Contains 75 references.) (KB)

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THE INTERGENERATION TRANSMISSION OF ATTACHMENT: HOW DO WE ACCOUNT FOR THE "TRANSMISSION GAP"?

A Doctoral Research Paper

Presented to

the Faculty of the Rosemead School of Psychology

Biola University

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In Partial Fulfillment

of the Requirements for the Degree

Doctor of Psychology

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by

Ann Marie Verneuil

August, 2001

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ABSTRACT

THE INTERGENERATION TRANSMISSION OF
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FOR THE "TRANSMISSION GAP"

by

Ann Marie Verneuil

This paper presents a review of the empirical literature that examines the intergenerational transmission of attachment styles. The relationship between adult caregivers' internal representations of attachment as measured by the Adult Attachment Interview and their infants' attachment status as measured by the Strange Situation procedure has been established across numerous studies. This paper examines the means by which attachment is "passed down" from one generation to another or what is known as "the transmission gap." Maternal characteristics such as expectation about parenting; internal representations of oneself as caregiver, one's child, and their relationship; maternal sensitivity; and distress tolerance are explored. Infant temperament is taken into consideration, and environmental characteristics such as nonmaternal care, amount of physical contact with caregiver, the presence or arrival of a sibling, sleeping arrangements, and external stressors are also discussed. Implications for clinical intervention with parent-infant dyads and/or at-risk individuals prior to the birth of an infant are also discussed.

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THE INTERGENERATIONAL TRANSMISSION OF ATTACHMENT: HOW DO WE ACCOUNT FOR THE "TRANSMISSION GAP"?

Introduction

Attachment theory and research have a long history. This paper will examine the intergenerational transmission of attachment styles, a specific area of attachment theory regarding the long-term impact of the infant-caregiver relationship. The implications for later functioning are varied and significant. Current research highlights the importance of understanding the determinants of infant attachment and implicates insecure infant attachment as a primary source of problems associated with later socioemotional development (Joffe & Vaughn, 1982; Lamb, 1987; Lyons-Ruth, Alpern, & Repacholi, 1993) and psychological problems (Fonagy et al., 1996; Pianta, Egeland, & Adam, 1996). Conversely, secure attachment may actually serve as a protective mechanism against later difficulties in life (Bretherton, 1985; Rutter, 1987).

In fact, research regarding the development of secure attachment has received much attention recently as new findings provide greater understanding of the developing mind of the infant. Schore (1997) has shown that attachment relationships actually dictate the pruning or proliferation of excitatory and inhibitory systems in the central nervous system. Furthermore, the development of the Adult Attachment Inventory (AAI), which measures

attachment status in adults, has provided an unprecedented opportunity to explore the correlation between parents' attachment status and the attachment classifications of their children. As will be discussed, a strong correlation is apparent between adult attachment status as measured by the AAI and infant attachment classification as measured by the Strange Situation (SS).

Nevertheless, the means by which attachment is "passed down" from one generation to another remain unclear. If attachment measures describe an internal representation within an adult, by what means is an infant able to access this information? An infant does not have direct access to the mind of the adult. This led to the assumption that there must be some characteristic or behavior pattern that accounts for how secure attachment is transmitted from parent to infant. This elusive variable, or missing link, has been referred to as the "transmission gap" (van Ijzendoorn, 1995). Before examining this issue, the concept of attachment will be defined, and the development of the AAI and SS will be explicated. Finally, the connection between the two measures will be explored. Only studies that measured infant attachment using the SS with infants (12-18 months of age) and measured adult attachment status using the AAI have been included in this review. Implications for future research and clinical practice will be discussed.

Attachment Research and Instruments

The primary means of assessing attachment have been adapted from information gleaned from early attachment research. The seminal works of John Bowlby, Mary Ainsworth, and Mary Main have continued to provide a

reliable foundation for the development of highly useful measures of human attachment. In fact, the field of attachment research appears to have progressed through three relatively distinct phases.

John Bowlby

In the first phase of attachment research, John Bowlby (1969), a family psychiatrist in London, drew on observations of nonhuman primates and evolutionary theory, proposing that an attachment behavioral system was responsible for infant survival and safety. He postulated that "attachment" is an inborn system in the brain that evolves in ways that organize motivational, emotional, and memory processes in relationship to significant caregivers. This system motivates infants to seek proximity to their caregivers and use them as a safe haven when alarmed or distressed. At an evolutionary level, this increases infants' chances for survival. At the level of mental development, attachment establishes an interpersonal relationship that helps an infant's immature brain use the mature functions of the parent's brain to organize his or her own mental processes. In particular, the assistance parents provide in reducing negative emotions (e.g., fear, anxiety, sadness) soothes children and helps them develop the capacity to soothe themselves.

During this phase of attachment theory development, four important findings were revealed: (a) Earliest attachments are usually formed by 7 months of age; (b) nearly all infants become attached to only a few people; (c) these "selective attachments" appear to be derived from social interactions with the attachment figures; and (d) these attachments lead to specific organizational changes in the infant's behavior and brain function.

Mary Ainsworth and the Strange Situation

The second phase in the development of attachment theory was ushered in by Mary Ainsworth, a Canadian psychologist. She identified three patterns of organized responses to separation and reunion among 12-month-olds using a laboratory procedure known as the Strange Situation (SS; Ainsworth, Blehar, Waters, & Wall, 1978). The SS is a 20-minute procedure that introduces infants to increasingly stressful events that are designed to activate the attachment system. The infant enters a novel environment (usually a lab filled with toys that invite exploration), a stranger arrives, and two separations and reunions take place. During these separations, the mother leaves the room for approximately 3 minutes and then returns. The stranger remains with the infant during the first separation and leaves upon the mother's return. During the second separation, however, the child is left completely alone.

Observations of infant-mother dyads provide data that determine infants' attachment classifications: secure (B), avoidant (A), and resistant-ambivalent (C). Most are classified as secure and exhibit signs of missing their mothers during the first separation and continue to show distress during the second separation. They actively seek closeness to their mothers upon their return, are quickly soothed, settle, and return to play. In contrast, resistant-ambivalent infants appear to be preoccupied with mother during the entire procedure and may appear to be angry while alternately seeking and avoiding her. They fail to be soothed and have difficulty returning to play upon reunion. Finally, avoidant infants display no signs of distress during the procedure and, instead, focus on the toys and their environment, actively ignoring or avoiding

the parent upon reunion (Ainsworth et al., 1978).

These differential responses to the SS were first noted by Ainsworth during her yearlong Baltimore study where she observed the interactions of 26 infant-mother dyads. During these observations in their own homes, mothers of secure infants were adept at pacing face-to-face interactions, held their infants carefully, and were sensitive to their infants' signals. Mothers of resistant-ambivalent infants were somewhat inept at holding their babies, were noncontingent in face-to-face interactions, and were more unpredictable. Mothers of avoidant infants tended to dismiss attachment behaviors and were averse to physical contact (Ainsworth et al., 1978).

During the 1980s, a growing number of infants appeared to be unclassifiable using the SS. Main and Solomon (1990) examined more than 200 SS videotapes of infants who tended to behave in conflicted and unorganized ways. For example, some infants would rise to greet their mothers upon their return and then fall prone or freeze all movement—their hands in the air and a trance-like expression on their faces. The discovery of these patterns of behavior led to the recognition of a fourth attachment classification: disorganized-disoriented (D).

Main and Hesse (1990) proposes that an attached infant would seek proximity to the parent when alarmed. However, if parental behavior itself has alarmed the infant, he or she is placed in a behavioral bind. The infant cannot approach the parent as a haven of safety because the parent is the frightening stimulus. This hypothesis has been supported by empirical studies of maltreated children whose behavior matches the disorganized-disoriented classification

(Cicchetti, Toth, & Lynch, 1995).

Questions have been raised about the validity and interpretation of the different behavioral responses of 12-month-old infants to the SS. In particular, the activation of the attachment system by the two separations in the SS has been questioned due to the fact that avoidant (A) infants show no overt distress and appear to be outwardly unaffected by the sequence of separations and reunions (Grossman & Grossman, 1990). This suggests that the SS may not create the same psychological experience for all infants (Sagi, van Ijzendoorn, & Koren-Karie, 1991). Second, the secure attachment response has been classified as the most adaptive. However, in some cultural contexts, the avoidant (A) response might be considered appropriate rather than as an ineffective coping mechanism (Hinde & Stevenson-Hinde, 1990). Finally, different attachment styles may each be a reaction to different parenting styles and simply represent different pathways toward maturity (Lamb, Thompson, Gardner, Charnov, & Estes, 1984).

With these questions in mind, Spangler and Grossman (1993) introduced biological measures to validate their interpretation and assessment of different attachment patterns. They measured heart rates and activation of the adrenocortical system (amount of salivary cortisol) to assess emotional arousal even in the absence of behavioral coping mechanisms or distress behavior. The researchers predicted that an increase in the infant's heart rate would indicate an activation of the attachment system. However, an increase in cortisol would be greater in insecurely attached infants (A, C, D) than in securely attached infants (B) who possess a more effective coping style. They categorized 41 healthy

infants into one of four attachment groups (A, B, C, D). Cardiac activity was assessed simultaneously during the SS, and cortisol responses were assessed using a saliva swab taken immediately before the SS and at 15 and 30 minutes after its completion.

Results revealed no differences in baseline heart rates between groups before the procedure. During separation, all groups showed increased heart rates; the highest increase was seen in disorganized (D) infants and was significantly different from the heart rate increase of both avoidant (A) and secure (B) groups ($p < .05$). These latter two groups (A, B) were not different from each other. No significant difference was apparent between attachment groups regarding initial cortisol values. Two groups of insecurely attached infants (A, D) showed an increase in cortisol compared to secure infants who showed a slight decrease. Following the SS, the difference between the secure group (B) and the disorganized group (D) was significant ($p < .05$), and the difference between the secure group (B) and the avoidant group (A) and the resistant-ambivalent group (C) approached significance ($p < .10$). These results indicate that even avoidant infants are affected by the SS, despite their lack of behavioral distress. Indeed, these findings, as well as those of others (e.g., Hertsgaard, Gunnar, Erickson, & Nachmias, 1995; Spangler & Schieche, 1994), support the validity of the SS and provide external support for the interpretations of the attachment classifications.

Mary Main and the Adult Attachment Inventory

The third and most current phase of research in the field of attachment has focused primarily on internal representations of attachment as measured by

the Adult Attachment Inventory (AAI; George, Kaplan, & Main, 1985). The AAI is an hour-long, semi-structured interview in which participants provide general descriptions of (a) childhood attachment relationships and specific supportive or contradictory memories, (b) loss of attachment figures or separations from attachment figures, and (c) evaluations of how these experiences might have affected their development and current personalities. For example, participants are asked to provide five adjectives to describe their childhood relationships with each parent as well as specific memories that support their word choices. Participants also evaluate these memories from current perspectives. Coding of the AAI rests on verbatim transcripts that are analyzed by the way participants reflect on childhood experiences and their effects on current functioning, rather than on the content of reported experiences. Hence the AAI is said to examine an adult's "mental representation of attachment" rather than actual histories (i.e., form vs. content analysis). Generally, content is irrelevant for AAI attachment classification.

Adult attachment classifications. Adults are classified as autonomous (F) when their representations and evaluations of childhood events are internally consistent and their responses are clear and succinct, regardless of whether the events were positive or negative. Autonomous adults are flexible enough to accommodate new ideas gained through reflection. They are objective about their relationships and value their attachments, regarding these experiences as influential (George et al., 1985).

Pearson, Cohn, Cowan, and Cowan (1994) developed a classification system that differentiates between two subclasses of the secure-autonomous

classification: continuous-secure and earned-secure, with seven scales of the AAI effectively differentiate between these subclasses: (a) loving mother, (b) loving father, (c) rejecting mother, (d) rejecting father, (e) neglecting mother, (f) neglecting father, and (g) coherence of mind (Lichtenstein, Belsky, & Crnic, 1998).

Individuals classified as continuous-secure report loving childhoods on the AAI mother loving and/or father loving scales and have highly coherent transcripts. Individuals classified as earned-secure report negative early experiences as indicated by low ratings on the AAI mother loving and/or father loving scales and high scores on the AAI mother neglecting, father neglecting, mother rejecting, and/or father rejecting scales. In fact, AAI transcripts of these individuals do not differ from the transcripts of those classified as insecure. Unlike those classified as insecure, however, the earned-secure adults show greater coherence in their transcripts. Based on this measure, their scores are no different from those classified as continuous-secure. Both groups are classified as autonomous despite their very different upbringing and demonstrate the possibility that one can rework their attachment representations later in life (Lichtenstein et al., 1998).

Adults are classified as preoccupied-entangled (E) when AAI responses indicate that they are preoccupied with past experiences and appear angry, confused, or overwhelmed. They lack the objectivity that is needed to overcome their preoccupations, and their transcripts tend to be long and marked by grammatically entangled sentences, vague pauses, and irrelevant responses (Lichtenstein et al., 1998).

The dismissing (Ds) classification is used when adults provide positive descriptions of their attachment relationships, but are unable to provide supportive evidence for these descriptions. These individuals may even contradict their descriptor choices with their examples. They are unable to identify ways their past experiences might be affecting them in the present and tend to normalize their experiences, idealize their caregivers, and insist they lack memory of their childhood. Their transcripts are relatively short (Lichtenstein et al., 1998).

An additional classification, unresolved-disorganized (U-d), is given when transcripts show a lapse in monitoring of reason or discourse while discussing trauma or loss surrounding attachment figures. These adults become disorganized while describing these events as evidenced by unfounded guilt, fear, or continuing disbelief that events actually happened. Although there seem to be unresolved issues with respect to a loss or trauma, these adults may otherwise fit into another attachment category (Lichtenstein et al., 1998).

Validity of the AAI. Several questions have been raised regarding the validity of the AAI. First, attachment theory postulates that the working model of attachment is developed in the first year of life, that it is essential to subsequent psychological development, and that it is stable over time. If this is the case, how can one explain the earned secure classification that indicates a reworking of that stable model? If the working model really is stable, what accounts for changes in an individual's attachment status? Second, the relationship between coherency of discourse about earlier memories and the actual experiences has been questioned. Does the AAI really measure

attachment status, or does it measure something else entirely? It has been hypothesized that coherency of discourse may have more to do with some other personality factor than it does with early attachment status (Fox, 1995).

Addressing these questions, a number of studies have shown the AAI to be valid in regard to construct, concurrent, and predictive validity. Bakermans-Kranenburg and van Ijzendoorn (1993) conducted a study wherein five interviewers interviewed 83 Dutch mothers on two separate occasions in a counterbalanced format. This procedure failed to arrive at different AAI classifications. Each interviewer-pair also showed stability of AAI classification over time. Sagi, van Ijzendoorn, Aviezer, Donnell, and Mayseless (1994) found similar results in a replication and extension study.

Stability of AAI classifications. The AAI has demonstrated stability over time and appears to be independent from interviewer bias and unrelated to IQ, general personality measures, social desirability, and autobiographical memory in cross-cultural studies (Bakermans-Kranenburg & van Ijzendoorn, 1993; Sagi et al., 1994).

The question of the accuracy in autobiographical accounts is irrelevant to the AAI because it was designed to measure something else, namely an adult's current mental representations of attachment, and is not concerned with the content of their story. Attachment classification is based on form alone. When coding the AAI, there is no assumption that a self-report of childhood reflects objective reality or that an adult's current state of mind is determined by critical experiences that occurred during the first year of life.

Most researchers agree that attachment is environmentally labile,

particularly during the early years, and that attachment continues to be sensitive to environmental changes throughout life, albeit to diminishing degrees. A negative mental representation (of oneself, one's caregivers, and one's environment) that is based on negative early life experiences is also subject to later alteration. Later life events or conditions may enable a person to work through the pain of early experiences and restructure internal representational models. Such conditions are most often described as the consistent support of another person (e.g., spouse, therapist) during childhood, adolescence, or even adulthood. These new experiences provide the individual with a more coherent perspective on past experiences and a deeper understanding of how early experiences have affected him or her.

This change in attachment is clearly delineated by the bifurcation of the autonomous classification into the earned-secure and continuous-secure categories. Despite early negative experiences, earned-secure individuals have learned to develop the ability to parent their own children with more empathy and sensitivity than their own parents provided (Bretherton, 1985; Main & Goldwyn, 1984).

The Relationship Between the SS and the AAI

Researchers have been able to examine the relationship between parent and infant attachment statuses by comparing data from the SS and the AAI. Manassis, Bradley, Goldberg, Hood, and Swinson (1994) examined 20 mothers who had been diagnosed with anxiety disorders. All mothers exhibited insecure attachment styles, and 78% (14 out of 18) had unresolved issues related to

experiences of loss or trauma. Sixty-five percent of the infants' attachment styles matched their mothers' attachment categories. Eighty percent of the infants were classified as insecurely attached, and 65% received an additional classification of disorganized.

Van Ijzendoorn (1995) conducted a meta-analysis of 14 studies that had been conducted on the relationship between AAI and SS classifications. He used the three-way classification system (i.e., autonomous, dismissing, or preoccupied for adults and secure, avoidant, or resistant for infants) because few studies have included the unresolved and disorganized categories. A total combined sample of 854 dyads revealed that the secure/insecure distinction had a combined effect size of $\underline{d} = 1.06$ ($\underline{Z} = 0.51$, $\underline{r} = 0.47$). This association is comparable to a strong correspondence (75%) between AAI and SS classifications. Two unpublished studies were included to prevent publication biases from inflating the result. It would require 1,087 studies with null results to reduce the one-tailed $\underline{p}$ level to insignificance.

The samples used in these studies had different types of participants (i.e., mothers and fathers) and different designs (e.g., prospective, retrospective, concurrent), which made an explanation of variability crucial. Tests for homogeneity did not show significant differences among effect sizes (χ^2 [17, $\underline{N}$ = 854] = 18.94, one-tailed). Also, a disjoint cluster analysis did not reveal significantly different clusters of samples. Some variation in effect sizes did exist. Infant attachment status tended to be more strongly correlated with maternal attachment status ($\underline{d} = 1.14$, $\underline{r} = 0.50$) than with paternal attachment status ($\underline{d}$ = 0.80, $\underline{r} = 0.37$; Van Ijzendoorn, 1995).

Other characteristics such as research design (retrospective, concurrent, prospective), sample selection, sample size, and participant characteristics (e.g., ethnicity, SES) were unrelated to effect size. Infant age was related to effect size ($p = 0.02$) in that the relationship between parental attachment and infant attachment was weaker for older children. Overall, the correspondence rate for parental and infant attachment using the two-way classification (i.e., insecure vs. secure) was 75% ($k = 0.49$). Using the three-way classification system, the correspondence rate was 70% ($k = 0.46$; Van Ijzendoorn, 1995).

More specifically, van Ijzendoorn and Bakermans-Kranenburg (1996) examined AAI classifications of nonclinical mothers and fathers. The researchers wanted to find out if secure wives tended to marry secure husbands and if insecure wives tended to marry insecure husbands. If this were the case, breaking intergenerational transmission of attachment would be more difficult. In a meta-analysis of 584 "normal" mothers (from 13 different samples), 58% were autonomous (F), 24% were dismissing (Ds), and 18% were preoccupied (E). In a meta-analysis of 286 "normal" fathers (from 6 different samples), 62% were autonomous (F), 22% were dismissing (Ds), and 16% were preoccupied (E). Hence the distribution of attachment classification of mothers and fathers was very similar.

However, the similarity of classifications did not imply similarity within couples. In five studies that included both husbands and wives (226 couples), a significant correspondence was found ($\chi^2 [4, N = 226] = 20.24$, $p = .0004$). The correspondence appeared to be based specifically on the autonomous (F) classification: women and men classified as autonomous tended to marry each

other more often than would be expected by chance (Haberman's adjusted standardized residual = 4.2). Additionally, three studies that utilized the four-way classification system revealed that women and men classified as unresolved (U) tended to marry each other more often than would be expected by chance (χ^2 [9, n= 152] = 18.22, p = .03, exact Fisher test). This correlation might explain the modest association between infant-mother and infant-father attachment security. However, the results showed that men classified as autonomous (F) were less likely to marry women classified as preoccupied-entangled (E). This, along with a lower-than-expected rate of dismissive (Ds) ratings among men, suggests that men are not so much dismissing in their attitudes about attachment as they are rejecting of preoccupied-entangled (E) attachments (van Ijzendoorn & Bakermans-Kranenburg, 1996).

In further examining the association between attachment classification of mothers, fathers, and their infants, Steele, Steele, and Fonagy (1996) examined the extent to which infant-mother and infant-father attachment classifications were dependent on one another. In a prospective design, 100 pregnant women and their husbands/partners were given the AAI during the last trimester of the mothers' pregnancy. SS assessments were administered for infant-mother attachment when their children were 12 months of age and for infant-father attachment when the children were 18 months of age. Comparing AAI (prenatally) and SS scores (at infants' age of 12 months), 79% of the mothers who were classified as secure had securely attached infants, 67% of the mothers who were classified as dismissing had avoidant infants, and 38% of the mothers who were classified as unresolved had disorganized infants. No specific

correlation was found between the maternal preoccupied classification and the resistant infant classification, which weakens the intergenerational correlation. The overall concordance rate between maternal attachment and infant-mother attachment was 64% ($\underline{k}$ = .39) using the four-way classification and 76% ($\underline{k}$ = .51) using the two-way classification.

When their infants were 18 months of age, 80% of the fathers who were classified as secure had securely attached infants, and 59% of the fathers who were classified as dismissing had avoidant infants. A preoccupied classification for fathers was not predictive of infant insecurity. Three fathers were classified as unresolved, yet none of their infants were classified as disorganized. The overall concordance rate between paternal attachment and infant-father attachment was 63% ($\underline{k}$ = .27) using the four-way classification and 71% ($\underline{k}$ = .35) using the two-way classification (Steele et al., 1996).

These results suggest a number of significant associations between parent and child attachment statuses. When examining both mothers and fathers, a dismissing pattern of attachment was highly predictive of an avoidant attachment in infants, and an autonomous pattern of attachment was predictive of a secure attachment in infants. However, parents who were classified as preoccupied did not seem to have resistant infants, and disorganized attachment for infants was associated with an unresolved status for mothers, but not fathers (Steele et al., 1996).

The observed similarity between infants' attachment classification with both parents could not be explained by a concordance between parents' attachment classifications. Other possible explanations for this similarity could

be infant temperament variables and a primary caregiver effect (i.e., the association between maternal attachment classification and infant-father attachment status was significant). This effect would be supported by the apparently greater influence of mothers upon infant-parent attachment classification. These results, however, were not conclusive. One consideration is that the SS was administered at infant age 12 months for mothers and at 18 months for fathers. It is possible that the SS is less effective during the second administration due to instrument fatigue or developmental differences in the children.

Regardless of these caveats, however, this research supports an intergenerational, as well as a relationship-specific, view of attachment. Infants appear to be able to discern differences in their parents' attachment styles and respond accordingly. These differences appear to influence their interactions with each parent as well, perhaps with the influence of the primary caregiver being foremost (Steele et al., 1996).

Benoit and Parker (1994) examined the stability of the AAI over a 12-month period and patterns of attachment across three (rather than two) generations and found similar results. They recruited 96 expectant mothers from a variety of nonclinical sources. Participants were given the AAI before the birth of their children and again when the children were approximately 12 months old. Infant attachment was assessed with the SS at 12 months of age. At that time, the AAI was also given to the maternal grandmothers. AAI classifications remained stable over the 12-month period for 77% of the mothers using the four-way classification and for 90% using the three-way classification.

Furthermore, mothers' AAI classifications during pregnancy were concordant with their own mothers' classifications in 75% of the pairs using the three-way classifications ($\chi^2 = 43.95$, $\underline{df} = 4$, $\underline{p} < .001$, $\underline{k} = .51$, $\underline{p} < .05$). Using the four-way classifications, however, attachment styles were not significantly concordant due to a high number of unresolved mothers and autonomous daughters. This could be explained by a higher likelihood of grandmothers having experienced more losses by virtue of their age. For mothers and infants, the match between classifications was 68% using the four-way classifications (χ^2=56.60, $\underline{df} = 9$, $\underline{p} < .001$, $\underline{k} = .46$) and increased to 81% using the three-way classifications ($\chi^2 = 47.59$, $\underline{df} = 4$, $\underline{p} < .001$, $\underline{k} = .57$). Sixty-five percent of the grandmother-mother-infant triads had corresponding attachment classifications across all three generations (Benoit & Parker, 1994).

Most abused children are disorganized in their attachment to caregivers (Cicchetti et al., 1995). It has been hypothesized that they are unable to find a solution to their distress in their caregivers and display bizarre and contradictory behavior. In low-risk populations, however, 15% of infants are also classified as disorganized (van Ijzendoorn, Schuengel, & Bakermans-Kranenburg, 1999). In these cases, the parents' unresolved loss appears to be associated with disorganized attachment in their infants. As the parent remembers the loss, their own frightened behavior may be experienced by the infant as frightening, which may be especially powerful if the infant perceives himself or herself as the source of fear.

Schuengel, Bakermans-Kranenburg, and van Ijzendoorn (1999) selected 85 mothers who had experienced an important loss by death (excluding their own mothers' deaths). Twenty mothers were classified as unresolved, and 65 were not. Participants received questionnaires when their infants were 8, 11, and 15 months old, and they were videotaped in their homes when their infants were 10 or 11 months old. They were interviewed in the laboratory when their infants were 12 months old and videotaped in the laboratory when their infants were 14 to 15 months old. Three types of behavior were coded as frightening: (a) threatening behavior, (b) frightened behavior, and (c) other indications that a parent may have entered a dissociated state.

A main effect for maternal attachment security was significant, F (1, 81) = 11.61, p = .001. Even more significant was the interaction between maternal security and unresolved loss, F (1, 81) = 15.70, p < .001. Insecure mothers with unresolved loss had the highest scores for frightening behavior, and secure mothers with unresolved loss had the lowest scores for frightening behavior. Twenty-six infants were classified as disorganized, and 59 infants were classified otherwise. Mothers of the disorganized infants had higher scores for frightening behavior (M = 3.82, SD = 1.54) than mothers of non-disorganized infants (M = 3.14, SD = 1.66), t (83) = 1.78, p = .04. Unresolved loss was linked to disorganized infant attachment among insecure mothers, but not among securely attached mothers (Schuengel et al., 1999).

In summary, although unresolved loss seems to be a risk factor for disorganization among infants, secure attachment appears to be a protective factor against transmission of disorganization. Significant loss and subsequent

emotional lability lead to frightening behavior in insecurely attached mothers. No correlations between frightening behavior and maternal depression, infant stress (prenatally and perinatally), severity of loss, or maternal sensitivity were found, thus ruling them out as alternative explanations for these results (Schuengel et al., 1999).

The "Transmission Gap"

A strong correlation between adult attachment as measured by the AAI and subsequent parent-infant attachment status as measured by the SS has been established. If the AAI measures an internal representation of attachment, the question remains: By what means does attachment get passed to infant offspring? How do we explain the gap in our understanding of the intergenerational transmission of attachment? Many hypotheses have been proposed to explain the link between parents' attachment and their infants' attachment. These hypotheses can be categorized by their respective interest in (a) maternal characteristics, (b) infant characteristics and their interactions with maternal variables, and (c) environmental or contextual variables.

Maternal Characteristics

Various studies have examined maternal characteristics such as expectations about parenting (e.g., the desire to have children, expected self-efficacy), personality traits (e.g., anxiety, depression), and "parental sensitivity" or "sensitive responsiveness" (the earliest and most extensively explored concept). One problem with examining maternal characteristics is the difficulty of isolating the mother's characteristics from those of the mother-infant dyad.

To more precisely measure whether maternal characteristics influence infant attachment, maternal measures need to be as methodologically independent of infant variables as possible. Measures that are taken prior to the birth of an infant may be subject to the influences of pregnancy and the anticipated birth of the infant.

Expectations about parenting. Rholes, Simpson, Blakely, Lanigan, and Allen (1997) avoided potentially confounding variables by exploring the relationship between attachment and the desire to have children in a college population before the participants were actively considering having children. These researchers hypothesized that AAI classifications are related to parenting behavior, and that insecurely attached individuals have expectations about parenting that may suggest they would not function well in the parental role in the future. Three hundred seventy-nine introductory psychology students (155 men, 224 women; ages 18-23 years) completed questionnaires assessing their attachment style, desire to have children, perceived ability to relate well to children, parenting beliefs, and expected parental behavior.

A greater number of participants who were classified as avoidant reported less interest in having children ($r = .30$, $p < .001$) regardless of gender. More insecurely attached (avoidant and ambivalent) individuals scored lower on warmth, $F (1, 375) = 5.03$, $p < .05$, as did those individuals who indicated a lesser desire to have children, $F (1, 374) = 52.49$, $p < .001$. More avoidant individuals, $F (1, 376) = 6.99$, $p < .01$, ambivalent individuals, $F (1, 375) = 6.30$, $p < .05$, and individuals with less desire to have children, $F (1, 374) = 6.49$, $p < .05$, had higher scores on strictness/harshness (Rholes et al., 1997).

Additionally, more avoidant individuals, F (1, 376) = 15.78, $p < .001$, ambivalent individuals F (1, 375) = 50.55, $p < .001$, and individuals who expressed less desire to have children, F (1, 374) = 18.03, $p < .001$, anticipated a tendency to be easily aggravated by children. These individuals also had a lower perceived ability to relate to children: avoidant, F (1, 376) = 25.70, $p < .001$; ambivalent, F (1, 375) = 15.64, $p < .001$; and those with less desire to have children F (1, 374) = 39.44, $p < .001$). Avoidant individuals, F (1, 376) = 4.56, $p < .05$, and those with less desire to have children, F (1, 374) = 39.44, $p < .001$, expected to receive less satisfaction from parenthood. A final analysis indicated that all these groups held more negative views of themselves as parents: avoidant, F (1, 376) = 15.74, $p < .001$, ambivalent, F (1, 375) = 19.67, $p < .001$, and those with less desire to have children F (1, 374) = 99.99, $p < .001$ (Rholes et al., 1997).

Through mediation analyses, Rholes et al. (1997) found significant connections for three parental expectations. The relationship between avoidance and warmth ($z = 2.47$, $p < .02$), ability to relate to children ($z = 2.49$, $p < .02$), and expected satisfaction ($z = 2.32$, $p < .03$) were all dependent upon the desire to have children. Avoidance was associated with a weaker desire to have children regardless of working models of parenthood, thus avoidant attachment may have its effect on parenthood via reducing the desire to have children. Avoidantly attached adults also anticipated negative qualities in their children and in their relationships with them. The internal representational model associated with adult avoidance may shield the avoidant parent from awareness of a child's need for comfort and highlight the negative qualities of his or her

behavior.

Ambivalently attached adults, on the other hand, hold a negative view of themselves as parents, but do not expect negative qualities in their children or in their relationship with them. Unlike avoidant adults, they desire close relationships with their children, but may have difficulty sustaining them because they doubt their own abilities as parents. Hence, a lower desire to have children may be the best predictor of later problems in the parent-child relationship (Rholes et al., 1997). This finding is notable when one considers that voluntary childlessness is quite rare, which suggests that many people who do not want children become parents nonetheless.

Personality traits. George and Solomon (1996) explored the corresponding internal representational models of mothers in regard to their caregiving. According to these researchers, representational models are constructed according to postulates about "self" (being a worthy and acceptable person), "other" (level of acceptance of the child), and "relationship" (ability to provide security). Representations of the self as caregiver include positive or negative evaluations along three dimensions: (a) willingness to respond, (b) effectiveness of caregiving strategies, and (c) ability to read and understand signals. Internal representational systems of infants and mothers should be different in a reciprocal fashion: The attachment system should organize behavior in the infant to seek protection and in the caregiving system to provide protection.

In a study (George & Solomon, 1996) of 32 families with kindergarteners, mothers and children were observed in their homes on three occasions in 2-

hour intervals over the course of 12 to 16 weeks. Following the last home visit, participants attended a laboratory session wherein mothers were interviewed regarding their views of themselves as parents, the affective aspects of their relationships with their children, and how they managed attachment issues (e.g., separation due to school). Mothers were rated on four 7-point scales measuring secure base (mother's commitment and ability to provide physical and psychological protection), rejection (degree to which they saw themselves and their children as unwilling to participate in the caregiving relationship), uncertainty (degree of questioning, doubt, and confusion in their opinions of themselves as caregivers, their children, and their relationships), and helplessness (degree to which mothers saw themselves, their children, or their relationship as out of their control). Mothers were also classified on attachment using the AAI, and the children's attachment statuses were assessed using observational data gathered during the lab separation and reunion.

As George and Solomon (1996) predicted, there was a strong concordance rate among maternal representations of caregiving, AAI classifications, and children's attachment. Mothers of secure children received the highest ratings on secure base, F (11.04) = 5.44, p = .000. Mothers of avoidant children received the highest ratings for rejection, F (9.59) = 5.50, p = .000; mothers of ambivalent children received the highest ratings for uncertainty, F (4.45) = 5.35, p = .01; and mothers of controlling children received the highest ratings for helplessness, F (8.97) = 5.00, p = .000.

Classification matches were found for 81% of the dyads (k = .75, t = 7.20, p = .000). Likewise, mothers with high scores on secure base were likely to be

classified as secure by the AAI. Mothers with high scores on rejection were likely to be classified as dismissing, mothers with high scores on uncertainty were likely to be classified as preoccupied, and mothers with high ratings on helplessness were likely to be classified as unresolved. The overall concordance rate for the mothers' current representation of caregiving and attachment classifications was 69% (k = .58, t = 5.71, p = .000). This supports the hypothesis that there is a link between caregiving classifications and adult attachment classification on a representational level. George and Solomon (1996) suggest that clinical interventions should be targeted, at least in part, at caregivers' mental representations of themselves in that role.

Sensitivity and responsiveness. Bowlby (1969) was the first to suggest that the sensitivity of caregivers to their infant's signals is one factor that contributes to the development of secure attachment in infants. Ainsworth (Ainsworth et al., 1978), following her development of the SS, concluded, "The most important aspect of maternal behavior commonly associated with the security-anxiety dimension of infant attachment... [is] ...sensitive responsiveness to the infant's signals and communications..." (p. 152).

A number of studies have examined the link between internalized maternal attachment representations, maternal sensitivity to the infant, and subsequent mother-infant attachment. Van Ijzendoorn's (1995) meta-analysis revealed a strong association between AAI classifications and infant-parent attachment. This meta-analysis also examined the relationship between AAI classifications and parental responsiveness and revealed that 23% of the direct association between parental attachment classification and infant-parent

attachment status could be explained by parental sensitivity. This reliable, but weaker, association leaves a large portion of the relationship to be attributed to something else.

A meta-analysis by de Wolff and van Ijzendoorn (1997) lends further support to this hypothesis regarding parental sensitivity. In 66 studies of parental antecedents of infant attachment, these researchers factored the parental interactive variables into the following nine categories: (a) synchrony, "the extent to which interaction appeared to be reciprocal and mutually rewarding"; (b) mutuality, "the mother's skill at modulating the baby's arousal, her entertainment style, and her responsiveness to the infant's cues"; (c) support, "extent to which the mother appeared attentive and available to the child and supportive of their efforts"; (d) positive attitude, "the mother's expression of positive and negative affect to the baby and the degree to which mother and infant engaged in reciprocal interactions"; (e) stimulation, "any action on the part of the mother directed toward her baby"; (f) contiguity of response, frequency of response to the infant's signals; (g) physical contact, any physical contact between caregiver and infant; (h) cooperation, "the presence or absence of intrusive or interfering maternal behavior"; and (i) sensitivity, "the ability to respond appropriately and promptly to the signals of the infant" (pp. 574-575).

The strongest correlation between maternal behavior and infant attachment was found in the studies on mutuality, $\underline{r}$ (166) = .32, but only three studies used this measure. The weakest effect sizes were found in the studies on Contiguity of Response, $\underline{r}$ (823) = .10, and Physical Contact, $\underline{r}$ (635) = .09. Other

effect sizes were for Cooperation, r (491) = .13, Stimulation, r (420) = .18, Positive Attitude, r (1,090) = .18, and Emotional Support, r (1,662) = .16. Overall, the average correlation between sensitivity and SS classification was r (1,097) = .24, indicating a moderate correlation. These results attest to the important causal role of sensitivity in the development of secure attachment in infants, but it is by no means an exclusive causal role. The effect sizes for mutuality and synchrony were similar in size to those for sensitivity (de Wolff & van Ijzendoorn, 1997).

In short, de Wolff and van Ijzendoorn (1997) found that parental sensitivity is an important, but not exclusive, condition for secure infant attachment in nonclinical samples. The number of differing operational definitions for sensitivity attest to the difficulty of measuring this elusive quality. Some have conceptualized sensitivity as a characteristic of the parent, whereas others assert that it is a characteristic of the dyad.

Somewhat different findings emerged when Ward and Carlson (1995) examined 94 adolescent primiparous mothers. The AAI was administered to the mothers during the third trimester of pregnancy. Behavioral observations of the mothers with their infants at 3 months and 9 months of age were used to assess maternal sensitivity. Infant-mother attachment was assessed by the SS when the children were 15 months of age. AAI attachment classifications predicted later infant-mother attachment status with a 78% concordance rate between maternal classification and infant-mother attachment status using secure/insecure categories. For individual classifications, 86% of the autonomous mothers had secure infants, 73% of the dismissing mothers had avoidant infants, 60% of the preoccupied mothers had resistant infants, and 43% of the unresolved mothers

had disorganized infants. Hence, the expected correlation between the AAI and the SS was revealed. Attachment classification on the AAI also predicted later caregiving. Adolescents classified as autonomous provided more sensitive care than did their nonautonomous counterparts when their infants were 3 months old (t [57.6] = 2.17, $p < .05$, $n = 80$; F: $M = 22.48$, $SD = 3.34$ vs. non-F: $M = 20.44$, $SD = 4.76$) and 9 months old (t [47.2] = 2.23, $p < .05$, $n = 77$; F: $M = 21.22$, $SD = 5.43$ vs. non-F: $M = 17.89$, $SD = 6.82$). The expected link between caregiver sensitivity and infant-mother attachment status, however, was not demonstrated in this sample. Overall, a strong association between the AAI and the SS classifications was found, and a moderate association between AAI classifications and sensitivity ratings was found. However, no association was found between sensitivity ratings and SS attachment classifications. Hence maternal sensitivity did not account for the means through which attachment was transmitted from parent to infant.

Pederson, Gleason, Moran, and Bento (1998) also failed to find strong support for an association between maternal sensitivity and infant-mother attachment. Participants were 60 mothers of healthy 12-month-old infants. Infant-mother dyads were observed through semi-structured home visits and given a sensitivity score. Subsequently, infants were observed using the SS and mothers were interviewed using the AAI. Results showed that sensitivity scores for autonomous mothers ($M = 0.57$, $SD = 0.39$) were significantly higher than for the nonautonomous mothers ($M = 0.27$, $SD = 0.63$), t (44) = 2.24, $p < .05$. The predicted association between maternal AAI classifications and infant-mother attachment status (SS) was also found for 73% of the dyads. Therefore a direct

path between autonomy and security (accounting for 49% of the variance) was supported, but a path to security mediated by maternal sensitivity (accounting for 10% of the variance) was not.

Del Carmen, Pedersen, Huffman, and Bryan (1993) explored several maternal, infant, and dyadic variables as potential predictors of secure attachment. Fifty-two middleclass to upper middleclass mothers and their infants were recruited through newspaper announcements and prenatal classes. Measures of maternal depression, anxiety, and self-efficacy were taken prenatally. Infant characteristics and dyadic behaviors were assessed when the infants were 3 months old, and attachment was assessed using the SS when the infants were 12 months old. Results revealed that prenatal maternal anxiety was the best single predictor of subsequent infant attachment classification, (Wilks lambda = 1.26; χ^2 [3, $\underline{N}$ = 52], $\underline{p}$ < .01). Infant negativity at 3 months of age was significantly correlated with security of attachment at 12 months of age ($\underline{r}$ = .31, $\underline{p}$ = .04). However, using all infant temperament measures as predictors, the overall statistic for temperament from the discriminant function analysis was not significant. The strongest predictor of attachment for mother-infant dyadic behavior was distress management interactions (Wilks lambda = 1.08, χ^2 (3, $\underline{N}$ = 52), $\underline{p}$ < .001), which was a stronger predictor of attachment than any other maternal or infant variable alone.

Del Carmen et al.'s (1993) study suggests that a critical component in the establishment of attachment is the responsiveness of parents to distress cues from their infants during the first 3 months of life. Higher rates of infant fussing or crying were not associated with less secure attachment. When these

behaviors were met with frequent and prompt maternal responses (i.e., contact to sooth and calm the infant), they facilitated secure attachment.

Since mothers' higher prenatal anxiety predicts insecure infant attachment, one question for future research is what are the behavioral consequences of this measure? Del Carmen et al. (1993) hypothesized that the "missing link" is the management of negative affect and that mothers' prenatal anxiety measures tap into their ability to manage their own negative distress. These differences in maternal management of negative affect are then carried over with their offspring and are an important component in understanding maternal predictors of attachment. These researchers concluded that salient factors in predicting secure attachment could be successfully identified by assessing maternal anxiety during the prenatal period, but that variables measuring infant-mother dyadic behavior, specifically distress management, were the best predictors of security of attachment.

Other studies have focused specifically on individual factors within the AAI that relate to secure attachment. One scale on the AAI specifically looks at "metacognition." This scale is similar to what others have called the "reflective-self function" (i.e., the "internal observer of mental life" or "the dialectical complement to the experiencing self"; Fonagy, Steele, Steele, Moran, & Higgitt, 1991) that constructs a mental representation of the self as both the one observed and the observer and that is able to reflect upon both. This concept has been explored on a cognitive level by developmental psychologists as metacognition or "theory of mind" that addresses the unique ability of the human mind to understand its own mental state as well as the mental state and

behavior of others. The development of the reflective-self function in early childhood is considered an essential step in emotional development since the awareness of mental processes in both self and others are intrinsically linked. It would make sense then that, as this reflective capacity is established by the infant's contemplation of the mental state of the caregiver, the predisposition of the caregiver toward the infant would significantly impact the development of this capacity. Several studies have looked at how this ability to reflect upon one's own mental functions and those of others might impact the development of attachment between infant and caregiver.

The London Parent-Child Project (Fonagy et al., 1991), which revealed a significant correlation between mothers' prenatal AAI classifications and the attachment status of their infants at 12 months old, also examined reflective-self function as the possible process underlying the intergenerational transmission of attachment. These researchers constructed a scale to assess parents' ability to understand the intentionality of others. At the low end of the scale were those who were unable or unwilling to reflect on their own intentions and those of others. At the high end of the scale were those who were willing and able to reflect on the motivations and intentions of their parents and themselves, both as adults and during their childhood. Results of AAI transcript analyses showed that the dimension most closely related to infant security was coherency or internal consistency ($r = .51$, $p < .001$ for mothers $r = .36$, $p < .001$ for fathers). However, when reflective-self function was controlled for, the relationship between coherency and infant security was no longer significant. The researchers concluded that the predictive power of coherency may lie in its close

tie to reflective-self function and explained intergenerational attachment transmission as being based on parents' ability to understand their infants' mental world, which, in turn, is based on the construction of coherent internal representations of attachment from the parents' attachment history. Of the 18 scales on the AAI, internal coherence of the transcript was the strongest predictor of AAI classification and infant-parent attachment status. Fonagy et al. assert that coherence is derived from the ability to reflect on mental functioning and that, as such, it is merely a measure of reflective function. This latter attribute of reflective function is, therefore, most responsible for the transmission of secure attachment and determines the extent to which the infant can assume (based on experience) that his or her mental state will be reflected on and responded to accurately.

As early as infants begin to speak, they communicate about emotions. Narrative capacity has been viewed by many as a new level of emotional organization for an infant (Stern, 1985). Bretherton (1990) has further suggested that open communication between infant and caregiver allows the infant to form coherent internal representations of attachment relationships. To assess these variables, Oppenheim, Nir, Warren, and Emde (1997) studied 51 children (55 and 66 months of age) and their mothers. The mother-child dyads were asked to "make up a story about a Mommy and a Daddy going on a trip without the little boy (girl) and later coming back" (p. 286). Observations were divided into three phases: (a) separation, from the beginning of observation until the parents left; (b) parental absence, while the parents were away; and (c) reunion. Ratings for children's emotional coherence and maternal facilitation

were derived from videotapes and based on the enacted narrative. Later, with the mother present but not facilitating the story construction, children were given the MacArthur Story-Stem Battery (MSSB) describing a number of emotionally laden, conflictual family interactions. Finally, mothers completed the Child Behavior Checklist (CBCL), and children were given the Expressive One Word Picture Vocabulary Test (EOWPVT) to assess expressive language skills.

Results showed that children's emotional coherence was not associated with their expressive vocabulary ($r = .00$). Children who were rated higher on emotional coherence did, however, have more pro-social themes ($r = .53$, $p < .001$ and $r = .76$, $p < .001$ at ages 4 1/2 and 5 1/2 years, respectively), less aggressive themes ($r = -.51$, $p < .001$ and $r = -.27$, $p < .05$ at ages 4 1/2 and 5 1/2 years, respectively), and had lower externalizing problem scores ($r = -.29$, $p < .05$ and $r = -.26$, $p < .05$ at ages 4 1/2 and 5 1/2 years, respectively) both concurrently and 1 year later. Only one finding was significant for maternal facilitation of narrative: Mothers who were rated higher on facilitation had children who used fewer aggressive themes in their narratives ($r = -.27$, $p < .05$) at age 4 1/2 years (Oppenheim et al., 1997).

Oppenheim et al. (1997) hypothesized that narrative coherence, although a cognitive and linguistic component of narrative construction, is related to emotion regulation for a number of reasons. The children became emotionally engaged in the story, even acting out various roles. In order to produce a logical sequence of events, they had to maintain cognitive organization while coping with the emotional story stems. To receive a high score, they had to deal with

the main theme and bring the story to a conclusion; they could not merely suggest a logical sequence of events that did not deal with the emotional theme. This supports the importance of emotional regulation in narrative coherency; however, the specific way that emotion regulation is facilitated or impaired by parental behavior warrants further investigation.

Infant Variables and Their Interactions With Maternal Variables

Just as parents differ in their abilities to respond sensitively to their infants, infants differ in their abilities to communicate their needs and signal their caregivers. Surely, infants have some effect on the quality of their parents' interactions. Hence, infant antecedents to secure attachment have been studied, as well as their interactions with parental antecedents. One such infant antecedent is temperament.

Seifer, Schiller, Sameroff, Resnick, and Riordan (1996) examined the relationship between maternal sensitivity and attachment status, the relationship between infant temperament and attachment status, and the relationship between infant temperament and maternal sensitivity. Forty-nine intact, Caucasian families were videotaped in the home to assess infant temperament and maternal sensitivity. Each family was observed on 24 occasions: 8 times each before their infants were 6, 9, and 12 months old. The Parent-Caregiver Involvement Scale (PCIS) was used to assess maternal sensitivity, parent report measures and observational data were used to assess infant temperament, and the SS was used to assess infant attachment.

Results revealed no significant relationship between maternal sensitivity and infant attachment classification using the SS. Few infant temperament measures (either observer-report or mother-reported) were related to SS classification although the overall relationship of infant temperament to attachment status was stronger than for maternal sensitivity. Neither was related to SS classification in an expected way. Maternal sensitivity and infant temperament (observed), however, were related to each other. In particular, observed mood (r = .43 and .33, respectively) and approach (r = .29 and .36, respectively) were related to maternal sensitivity at 6 months and 9 months. Observed intensity (r = .30) and total difficulty (r = .31) were also related to maternal sensitivity at 9 months of age. These results are far from clear in identifying antecedents of attachment. This study does, however, support the notion that a combination of factors may be involved and that an either-or view in terms of causality is too limited to be useful (Seifer et al., 1996).

With the hypothesis that the relationship between infant attachment and infant temperament is a complex one, Susman-Stillman, Kalkoske, Egeland, and Waldman (1996) devised a study to test possible models of interrelations between these two variables. They examined two dimensions of infant temperament (irritability and sociability) and three models of maternal sensitivity (moderator, mediator, and additive) as predictors of attachment classification. Participants (predominantly European Americans) were 212 primiparous women (12-37 years of age) who were receiving prenatal care through public assistance. Infant temperament was measured during the neonatal period, at 3 months of age, and at 6 months of age using interview and

observational data. Maternal sensitivity was measured by observational methods during feeding situations at 3 months of age and 6 months of age. Attachment classification was assessed at 12 months of age using the SS. Twenty-one percent of the infants were classified as insecure-avoidant (n = 46), 56% were classified as secure (n = 117), and 23% were classified as insecure-resistant (n = 48). At 3 months, there was evidence of a moderator model: Maternal sensitivity moderated irritability in that sensitivity increased the likelihood of secure attachment, but only when irritability was low (model χ^2 [1, N = 99] = 4.36, p < .04; -2 log likelihood, χ^2 [97] = 132.39, p < .001; Wald [1] = 4.07, p < .05; β = -0.30; R = -.12).

At 6 months, an additive model was supported: Maternal sensitivity had a positive relationship with secure attachment. A mediator effect for maternal sensitivity was also found: Irritability had an indirect effect on attachment security through maternal sensitivity. Contrary to the 3-month findings, no moderator effect was found. Several additive effects were found within the insecure attachment classification. At 3 months, high sociability predicted avoidant attachment (model χ^2 [2, N = 91] = 5.24, p < .07; -2 log likelihood, χ^2 [87] = 119.48, p < .01; Wald [1] = 4.45, p < .04; β = -0.91; R = -.14). At 6 months, high irritability predicted resistant attachment (model χ^2 [2, N = 78] = 3.82, p < .15; -2 log likelihood, χ^2 [74] = 102.91, p < .02; Wald [1] = 2.56, p < .11; β = 1.17; R = .07; Susman-Stillman et al., 1996).

Susman-Stillman et al.'s (1996) findings seem to support their hypotheses that maternal sensitivity predicts security of attachment and that infant temperament predicts type of insecure attachment. The correlations between

temperament and maternal sensitivity (positive for sociability and negative for irritability) suggest that maternal behavior is influenced by infant temperament. When infant and mother variables are considered in relation to each other, a more complex relationship exists than previous research has explicated.

Although distress management has been found to be a strong predictor of later attachment status, the nature of distress management remains a controversial issue. The core dispute is whether the factors that contribute to emotional expression are intrinsic to a child (e.g., temperament) or are emergent properties of the parent-child relationship (e.g., attachment). The SS, the most frequently used attachment instrument, was designed to measure the behavioral adaptation of infants, not under typical circumstances, but under challenging ones. This procedure entails aspects of novelty, separation, distress, and soothing (Ainsworth et al., 1978)—all circumstances where differences in traits or temperament would emerge.

Proponents of the temperament perspective argue that intrinsic factors predispose a child to respond to environmental stressors in certain ways, and that there is no need to look for a relationship variable to explain these differences. Conversely, attachment theorists purport that the relationship itself is the source of positive and negative feelings that do not depend on threshold of response or characteristic mood. Attachment theorists (e.g., Belsky & Rovine, 1988; Egeland & Farber, 1984; Gunnar, Manglesdorf, Larson, & Hertsgaard, 1989; Vaughn, Lefever, Seifer, & Barglow, 1989; Weber, Levitt, & Clark, 1986) have also pointed out that researchers have failed to demonstrate significant relationships between commonly used infant temperament measures and the

insecure-secure classifications of the SS.

Vaughn et al. (1992) attempted to answer whether or not security of attachment could be assessed with acceptable discriminant validity vis-à-vis infant temperament by analyzing six different samples of nonclinical children (recruited from private obstetric practices, birth registers, daycare waiting lists, and ads in local newspapers). Their samples differed with respect to age, instruments used to assess temperament, and informants for attachment and temperament measures. These differences afforded opportunities for comparisons across instruments, informants, and ages. In examining the different temperament measures, six principal components were constructed. In each analysis, temperament scales for affect regulation accounted for the largest amount of variability (e.g., for the Carey scales, Mood, Adaptability, and/or Intensity; for the Bates scales, Fussy/Difficult, Unadaptable, and Unpredictable; for the Rothbart scales, Impulsivity, Activity Level, Anger, and High Intensity Pleasure). Additionally, five of the six samples, showed a modest to moderate negative correlation between security of attachment and the temperament score for negative reactivity (S2 $\underline{r}$ = -23; S3 $\underline{r}$ = -.35; S4 $\underline{r}$ = -.29; S5 $\underline{r}$ = -.29; S6 $\underline{r}$ = -.48). Overall, the degree of association between measures of attachment and temperament were not strong enough to suggest that these measures were redundant.

Vaughn et al. (1992) argue that these measures inevitably refer, in some degree, to both individual characteristics and to characteristics of the dyadic relationship between child and caregiver. Constructs such as negativity and/or dependency may lie too close to the midpoint of the continuum, thus making

discrete classification into one domain or another impossible. The researchers point out that (a) both child behavior and affect regulation occur within a social context; (b) when a parent is asked to provide temperament ratings for their child, the parent-child relationship will influence those scores; and (c) assessment of attachment quality cannot take place in a temperamental vacuum.

Therefore, infant temperament is not directly related to secure infant attachment but does interact with maternal sensitivity. It also overlaps with distress management in that an infant's attachment status had much to do with the infant's ability to tolerate separation anxiety during the SS. The common ground between temperament and attachment lies in their contribution to emotional development and affect regulation.

Environmental or Contextual Variables

Concrete variables have also been examined such as absence of mother (e.g., due to employment), carrying/physical contact, presence of a sibling, sleeping arrangements, and external stressors. In order to isolate a parent's secure attachment as a causative factor, variables such as low SES and single parenting must be ruled out. Secure parents must have securely attached children or display good parenting under conditions of increased stress as well as under optimal conditions. Otherwise, the variance could be explained by variables such as fewer environmental stressors or a supportive partner.

Since increasing numbers of infants routinely receive daycare outside their homes, it becomes more important to understand how these daily separations from their parents affect their security of attachment. Attachment

theory predicts that infants whose mothers are unavailable are more likely to develop insecure attachments. As a result, entry into daycare (i.e., nonmaternal care) in the first year of life has been identified as a risk factor for avoidant attachment by some researchers (e.g., Belsky, 1986), whereas others have offered other explanations for the association between early nonmaternal care and insecure attachment.

Clearly, a number of confounding variables are difficult to control for in researching nonmaternal care, which diminishes the ability to draw conclusions. These factors include self-selection biases that differentiate mothers who stay home with their infants from those who work outside the home (e.g., a potentially greater number of rejecting or dismissing mothers among working women). Another factor is whether or not the SS measures attachment in children of working mothers in the same way that it does in children whose mothers stay home. Furthermore, working mothers' attitudes may be more likely to foster independence in their children, and children placed in daycare may have more experience being separated from their mothers than do children of at-home mothers (Clarke-Stewart, 1989; Phillips, McCartney, Scarr, & Howes, 1987; Thompson, 1988). Higher levels of stress for working mothers (Clarke-Stewart, 1989), age of entry into nonmaternal care (Chase-Lansdale & Owen, 1987), quality of nonmaternal care (Howes, Rodning, Galluzzo, & Myers, 1988), infant gender (Belsky & Rovine, 1988), infant temperament, whether or not the family is intact (Vaughn, Grove, & Egeland, 1980), and any number of additional stressors may also be confounding variables. These factors are beyond the scope of this paper and make findings about nonmaternal care

tenuous and limited in their generalizability to the population.

Two factors often cited as confounding variables in studies of nonmaternal care have been external stressors (such as low SES or a non-intact family) and quality of substitute care. Barglow, Vaughn, and Moliter (1987) examined the effects of maternal absence due to employment and included a select sample to control for these variables. Infant-mother pairs ($\underline{N}$ = 110) were recruited from private obstetric practices and were identified as "at-home or "at-work." All mothers were middle to upper SES, and all were residing with the infants' fathers at the time of birth. Mothers in the at-work group initiated substitute care due to their employment at least 4 months prior to the study's attachment assessment when the children were 12 to 13 months of age. This group of infants ($\underline{N}$ = 72) received care in their own homes by a substitute caregiver who was not a family member. The at-home group of infants ($\underline{N}$ = 56) received care from their own mothers who were not absent from the home for more than 4 hours per week.

Several measures of demographic, attitudinal, and personality characteristics were used to assess whether the two groups differed from each other in significant ways. Only one group variable was significant: 72% ($\underline{N}$ = 39) of the at-work mothers were primiparous, whereas only 48% (N = 29) of the at-home mothers were primiparous (χ^2 [1] = 6.60, $\underline{p} < .01$). Post-hoc tests controlling for parity were used in all subsequent analyses. Mothers also completed measures of their infants' temperament (Carey Infant Temperament Questionnaire and the Minnesota Child Development Inventory) to assess whether their perceptions of their infants differed according to work status.

Infant attachment classification was measured at 12 months of age using the SS. Distribution of attachment classifications were significantly different between the two groups (χ^2 [2] = 8.74, $p < .02$). In the at-work group, 54% (29) were classified as secure, 31% (17) were avoidant, and 15% (8) were resistant. In the at-home group, 71% (40) were classified as secure, 9% (5) were avoidant, and 20% (11) were resistant. Collapsing the avoidant and the resistant categories, the chi-square statistic indicated that insecure attachments were more prevalent among the at-work group than among the at-home group (χ^2 [1] = 3.69, $p = .055$), and SS avoidance scores were significantly higher for infants of full-time working mothers than for those infants whose mothers stayed at home (t [108] = 2.88, $p < .005$). Controlling for parity, this correlation was evident for first-born infants only (χ^2 [2] = 6.11, $p < .05$). Analysis of later-born infants did not indicate a greater likelihood of insecure-avoidant infants among the at-work group (Barglow et al., 1987).

In summary, it would appear that daily, routine separation due to maternal employment that begins by the time the infant is 8 months old significantly increases the probability of insecure attachment (particularly avoidant attachment) among first-born infants. The correlation between employment and attachment could not be attributed to measured differences in either the mothers or their infants prior to the onset of substitute care. The attachment status of mothers, however, was not measured and hence a self-selection bias according to attachment status was impossible. On the other hand, the majority of infants (54%) in the at-work group were securely attached, suggesting that other variables (beyond the scope of this study) may moderate

the effects of daily separation. Although maternal absence may be a risk factor that increases the likelihood of insecure attachment, the outcome is not inevitable (Barglow et al., 1987).

As can be seen from the previous study, parity is also a factor to consider when examining infant attachment. A second pregnancy and the birth of a sibling may create stressors that could cause instability between a mother and her first-born child. Also, the family structure into which subsequent children are born will differ from the first-born's family by virtue of the presence of the sibling(s). Earlier studies using the Attachment Q-sort found negative change, from secure to less secure mother-firstborn attachment during the prenatal to postnatal period of a sibling (Teti, Sakin, Kucera, Caballeros, & Corns, 1993). Dunn and Kendrick (1980) used maternal interviews and observation and found increased independence as well as regression in first-born infants following the birth of a sibling.

In further study of the impact of the arrival of another child on first-born children, Touris, Kromelow, and Harding (1995) used the SS to examine the stability of attachment of first-born children during the last trimester and postpartum period of a second pregnancy. Participants, recruited from Lamaze classes, prenatal exercise classes, and various mother-toddler groups, were 40 White, middle to upper class infants from intact families wherein their mothers were the primary caregivers. The experimental group consisted of 20 infants whose mothers were pregnant with a second child, and the control group consisted of infants who were matched for age and sex. Both groups consisted of 11 boys and 9 girls. At the time of the first attachment assessment 2 to 3

months prior to the birth of a sibling, the mean age of the experimental group was 16.3 months, and the mean age of the control group was 17.6 months. At the time of the second observation 6 to 10 weeks after the birth of the sibling, the mean ages of the groups were 21 months and 21.5 months, respectively.

Touris et al. (1995) found that attachment classification for infants changed after the birth of subsequent siblings and occurred in both directions: from secure to insecure and from insecure to secure. The stability of attachment within the control group was significantly greater than for the experimental group (χ^2 [1] = 5.10, $p < .05$). In the experimental group, 6 infants' (32%) attachment classifications changed from secure to insecure, whereas 5 (26%) changed from insecure to secure. One changed from insecure- resistant to insecure-avoidant. In the control group, 2 changed from insecure to secure, and 2 changed from secure to insecure. Overall, these findings suggest that a second pregnancy and birth of a sibling are associated with instability in mother-infant attachment and raises the question, not only of what creates a secure bond, but what may alter that bond.

According to Bowlby's (1969) attachment theory, close proximity between infant and parent is of central importance. Ainsworth's (1967) studies in both Uganda and the U.S. revealed that the amount of time a parent spends holding an infant is related to security of attachment. Anisfeld, Casper, Nozyce, and Cunningham (1990) also examined physical contact and whether or not it contributes to secure attachment. In their study, the amount of physical contact an infant received was experimentally manipulated by random assignment of infant-mother pairs into two groups: One group received and agreed to use soft

infant carriers that allowed more physical contact, and the other group received and agreed to use infant seats that afforded less physical contact.

The soft infant carrier used in the Anisfeld et al. (1990) study exposed the infant to a variety of types of stimulation: contact comfort (Harlow & Mears, 1979), an early tactile experience, vestibular proprioreceptive stimulation, and kinesthetic stimulation. Furthermore, the mother's proximity to the infant might also affect her by making her more aware of the infant's needs and thus more responsive to them. Participants were 18 to 37 years of age, predominantly Black and Hispanic, low SES mothers who had delivered full-term, healthy babies at a large inner city hospital. Mothers must have received prenatal care and been enrolled in a pediatric practice for medical follow-up, speak English, and be available by phone. The final sample consisted of 23 women in the experimental (soft infant carriers) group and 26 women in the control (infant seat) group.

Using logistic regression analysis, Anisfeld et al. (1990) found significantly more securely attached mother-infant dyads (83%) in the experimental group than in the control group (38%; $\underline{B} = 1.93$, $\underline{SE} = .82$, $\underline{Z} = 2.35$, $\underline{p} = .019$). Additional analyses revealed that mothers in the experimental group were more responsive to their infants' vocalizations, and they scored higher on measures of maternal sensitivity. The experimental treatment, however, had an effect above and beyond that attributable to maternal responsiveness. No conclusion can be drawn from the study regarding the relation between sensitivity and security of attachment. Overall results suggest that increased physical contact through the use of a soft baby carrier affects the behavior of mothers by promoting

maternal responsiveness that is predictive of secure attachment.

In addition, the use of the soft infant carrier affected the behavior of the infants. The experimental group vocalized alone significantly less (experimental $\underline{M}$ = 4.57%, control group $\underline{M}$ = 9.73%; $\underline{t}$ [47] = 2.95, $\underline{p} < .01$) and began to smile later (experimental group $\underline{M}$ = 4.86 weeks, control group $\underline{M}$ = 3.68 weeks; $\underline{t}$ [47] = 2.31, $\underline{p} < .05$) than did infants in the control group. The experimental group also had less regular daily periods of crying (21%) than did the control group (52%; χ^2 [1, 49] = 5.23, $\underline{p} < .05$). Anisfeld et al. (1990) hypothesized that these behaviors are social releasers to promote proximity to their mothers and that carried infants had less need to activate them because they were already in close proximity to their mothers. In conclusion, this study suggests a causal relationship between physical contact and security of attachment between mother and infant by affecting both the mother and the infant.

Sleeping arrangements have also been examined as an ecological factor that may affect the transmission of attachment. An interesting study by Sagi et al. (1997) explored Adult Attachment Representations and infant-mother attachment status in two kibbutz settings. Forty-five mothers and infants participated, 20 of whom had communal sleeping arrangements and 25 of whom had home-based sleeping arrangements. In both groups, infants typically stayed at home with their mothers for the first 3 months of life. After this time, the mothers returned to work part-time and the infants were jointly cared for by their mothers (feeding) and caregivers (watching infants between maternal visits). Mothers typically returned to work full-time when their infants were approximately 6 months old, and by the time the infants were 12 months old,

they were under the full-time care of caregivers.

At this point both groups typically were cared for by a caregiver for 9 hours each day (7:00 am-4:00 pm), 6 days per week, and were with their parents at home from 4:00 pm to 8:00 pm. At 8:00 pm, the home-based kibbutzim infants remained at home with their families. The communal sleeping infants, however, were returned to the infant house. During the night, 2 adults spent 1 week every 6 months monitoring the infants. Due to the rotation of these "watchwomen," caregivers were often unfamiliar to the infants and did not have a stable bond with them. They were also often unable to respond promptly to the infants' needs during the night (Sagi et al., 1997).

Using a log-linear model to fit the data, Sagi et al. (1997) found that 19 home-based dyads (76%) had matching mother attachment and infant-mother attachment status, whereas 8 communal-sleeping dyads (40%) had matching mother attachment and infant-mother attachment status. The two groups were equivalent with respect to other factors, including parent variables, day-time care, infant variables, and other biographical variables, thus narrowing the focus to sleeping arrangements in accounting for the variance. Moreover, maternal attachment was similar in both kibbutz arrangements (65% and 72% secure in communal-sleeping and home-based arrangements, respectively). At the same time, distributions of infant-mother attachment classifications were very diverse (80% and 48% secure in home-based and communal-sleeping settings, respectively), thus suggesting a lack of transmission of security, particularly in the communal-sleeping arrangement.

This study (Sagi et al, 1994) replicated similar findings in another study of kibbutzim infants by the same researchers that also showed that ecological factors affect the transmission of attachment from one generation to the next. Both studies found that infants who sleep away from their primary caregivers are more likely to differ from them in attachment status. Hence the inaccessibility of their caregivers during the night with no appropriate substitutes interfered or mediated the transmission of attachment.

Summary

Adult caregivers' internal representations of attachment as measured by the AAI and their infants' attachment status as measured by the SS have been shown across numerous studies to be related to one another in systematic ways. The attachment relationship between a caregiver and infant is shaped by interactions during the infant's first years of life. Caregivers' attachment status shapes their interactions in such a way that secure parents are more likely to have infants that are securely attached, and insecure parents are more likely to have infants that are insecurely attached.

Further correlations between caregiver and infant attachment status within the secure/insecure categories also exist. It has been hypothesized that autonomous adults (F) are more sensitive to their infant's attachment signals and more likely to respond appropriately to them. This results in more securely attached infants. Dismissing parents (Ds) are hypothesized to be more rejecting towards their infant's attachment needs and are more likely to elicit avoidant attachment responses in their infants. Preoccupied parents (E) are hypothesized

to be more focused on their own attachment experiences and are therefore less likely to respond consistently to their infants' attachment signals. Hence, they may respond in unpredictable ways that are at times excessive and/or otherwise inappropriate, which is more likely to create resistant attachment responses in their infants. Finally, it has been postulated that parental behavior that is either frightened or frightening may explain the link between parents with unresolved loss (U) and the disorganized attachment responses in their infants.

Ainsworth et al.'s (1978) research helped establish that parents appear to substantially contribute to the attachment of their children. Evidence of this can be seen in the relationship between attachment to a given parent and the history of interaction with that parent. Since secure attachment is the most common type of attachment in ill or impaired children as well as in healthy children, it cannot be the sole product of being an "easy" infant. Studies with mothers and fathers have also shown that infants can have different attachment classifications to each parent (Steele et al., 1996). Recent neurobiological research has established that environmental factors shape the brain and that in infancy (the period of maximal growth) attachment relationships play a critical role in establishing synaptic connections (Schore, 1997). Interactions between caregivers and their infants directly shape how their mental representations develop. In this way, behavior, emotion, and models of others would be ingrained by experiences that occur even before children have the capacity for autobiographical memory.

The momentary alignment of mental states between caregiver and child is often referred to as affect attunement. It has been hypothesized that the caregiver's ability to serve a regulatory function for the infant is what allows the infant's mind to begin to develop the ability to regulate his or her own affect in the future. Psychoanalytic, object relations, and attachment theorists believe that elements of the attachment relationship are internalized as mental representations or internal working models. In other words, patterns of relating that are established early in life are expected to play a role in the ability to manage and express emotions (Main, Kaplan, & Cassidy, 1985). When the caregiver is routinely and consistently responsive to the infant's signals, the infant develops confidence that reassurance, tending, support, and care in general will be available when needed.

On a behavioral level, infants who have been cared for in this way are then able to generalize their expectations that others will be available and can develop a trusting attitude towards others. Based on the ability to effectively elicit responsiveness from their parents, they take forward a sense of their own efficacy and self-worth, expecting to master challenges in life. They internalize a template of empathy and reciprocity that leads them to value relationships. These behavioral patterns are supported by patterns of affect regulation. Patterns of responsive care entail appropriate affective stimulation and intervention to keep arousal within appropriate limits. This supports a full range of emotional expression with sufficient modulation, which allows organized behavior to be maintained. Schore (1997) has suggested that it is this very pattern of responsive care that is the major environmental factor responsible for

the pruning, balancing, and proliferation of excitatory and inhibitory systems in the central nervous system. These systems support both emotional regulation and behavioral flexibility.

Most, if not all, studies on the risk factors for psychiatric disorders in childhood and/or adulthood, note a difference in individuals' responses to adverse life events and stress: Some succumb to them, and some escape damage. A large body of knowledge identifies insecure attachment as a risk factor for later psychological problems, whereas secure attachment may actually serve as a protective mechanism. Insecure attachment is not viewed as a psychiatric disorder, but as a developmental variation that is predictive of later disturbances. Like any other single risk factor, most individuals with early insecure attachment do not develop psychiatric disorders. Whether or not these disorders ensue depends on a successive combination of liabilities and/or supportive interventions that either continue the individual on a path towards pathology or reroute them towards adaptation (Sroufe, 1997).

It makes sense that internal representations of attachment figures guide patterns of behavior and affect regulation in such a way as to give rise to different attachment strategies or behaviors. Likewise, it is logical that these different strategies, whether adaptive or defensive, give rise to differential vulnerabilities to psychological problems. For example, individuals classified as dismissing tend to utilize strategies that downplay or minimize thoughts and feelings associated with distressing attachment experiences (e.g., rejection by a caregiver). Hence, it makes sense that these individuals are more prone to disorders that entail overt denial or downplaying of distress, along with actions

that reveal distress. Conversely, individuals classified as preoccupied tend to utilize a strategy that relies on pronounced distress signals aimed at alerting an inconsistent caregiver. It makes sense that these individuals are more prone to disorders in which negative affect is openly acknowledged and perhaps even exaggerated (Rosenstein & Horowitz, 1996). Therefore, considering different psychological problems, one might say that the relationship between personality functioning and attachment lies in the choice of strategies used to defend against negative emotions while remaining in relationship with attachment figures. In this way, parental behavior is indeed involved in both the development of attachment patterns as well as in the development of specific psychological problems.

Disorganized attachment is the category most indicative of later, often more severe, psychological problems. Most abused and maltreated infants have been found to be disorganized (Cicchetti et al., 1995). A significant connection also exists between parents with unresolved trauma and disorganized infants. In the absence of maltreatment, some have speculated that unresolved loss or trauma in the parent will lead to frightened parental behavior that may be experienced as frightening by the infant. The proposed pathway is that unresolved loss in the parent leads to frightening/frightened behavior, which then leads to disorganized attachment in the infant.

Given the high degree of correlation between attachment status and later risk of psychological problems, the goal is to intervene in insecurely attached systems or to prevent insecure attachment in the first place. The link between attachment, neural development, and psychopathology suggests that early

intervention with at-risk dyads is well warranted. Beyond the correlation between adult attachment and infant attachment, clear behavioral antecedents that dictate the most effective means of intervention are unclear. Certainly, specific links have been found between parental behavior and infant attachments among different attachment classifications. These range from general descriptions of behavior patterns across different attachment categories to specific behaviors such as the link found between frightened or frightening parental behavior and disorganized infant attachment. It is quite difficult to say what specifically imparts secure or insecure attachment to infants. Infant factors (e.g., infant temperament), ecological factors (e.g., the presence of caregivers, infant proximity to caregivers), and parental attributes (e.g., affect regulation, sensitivity, reflective function) have been examined.

Several studies reviewed in this paper specifically examined maternal characteristics. Rholes et al. (1997) explored the correlations between the desire to have children and adult attachment status. More specifically, insecure-avoidant adults expressed less desire to have children and expected less satisfaction from parenthood than did secure adults. The relationship between (a) avoidant attachment and (b) warmth, ability to relate to children, and expected satisfaction was mediated by the desire to have children. In other words, when the desire to have children was controlled for, the relationship between avoidant attachment and warmth, ability to relate to children, and expected satisfaction from parenthood was no longer significant. Hence, this study suggests that the best predictor of problems in parenting is the lack of desire to have children. Several of these expectations about parenting would fall

into what George and Solomon (1996) call internal representation models. These researchers examined representational models that were constructed according to postulates about oneself (self), one's child (other), and their relationship. They found a strong concordance rate between maternal representations of caregiving, AAI attachment classification, and infant attachment. Mothers of securely attached children were more likely to be classified as autonomous and scored highest on commitment to provide physical and psychological protection for their children. Mothers of avoidant children were more likely to be classified as dismissing and more likely to see themselves or their children as unwilling to participate in the caregiving relationship. Mothers of ambivalent children were more likely to be classified as preoccupied and had the highest degree of doubting, questioning, and confusion about their roles as caregiver, their child, or their relationships. Hence a caregiver's mental representation of self, child, and his or her relationship with the child play a significant role in the ability to be responsive and appear to be directly correlated to their attachment status.

Maternal sensitivity (or sensitive responsiveness) was first suggested as a factor in the transmission of secure attachment by Bowlby (1969). Ainsworth et al. (1978) agreed that sensitive responsiveness to the infant's signals was the most important aspect of maternal behavior that contributes to security of attachment. Although some studies have found no direct relationship between sensitivity and infant attachment (Pedersen et al., 1998; Seifer et al., 1996; Ward & Carlson, 1995), other studies (e.g., van Ijzendoorn, 1995) have examined this factor and found that 23% of the direct association between parent attachment classification and infant attachment could be accounted for by parental

sensitivity. Hence, research has not been able to show that sensitivity alone accounts for the correlation between parental and infant attachment status.

One difficulty in examining maternal sensitivity is the sheer number of differing operational definitions. In an attempt to clarify this somewhat elusive quality, de Wolff and van Ijzendoorn (1997) examined 66 studies and broke down parental interaction factors into nine different categories. Overall, the average correlation between sensitivity and infant attachment was modest (r [1,097] = .24). The factor with the largest effect size was mutuality, defined as "the mother's skill at modulating the baby's arousal, her entertainment style, and her responsiveness to the infant's cues" (p. 71). This was the only factor that directly examined the mother's ability to modulate arousal or, to put it another way, the ability to regulate affect.

The ability to regulate affect (negative affect in particular) was also found to be a crucial factor in another study (Del Carmen et al., 1993). They found that among maternal characteristics, prenatal maternal anxiety was the strongest predictor of attachment and was negatively correlated with secure infant attachment. For infant-mother dyadic behavior, the strongest predictor of attachment was distress management interactions. It appears from this research that the management of negative affect is crucial and that the mother's ability to manage her own negative distress is reflected in her levels of prenatal anxiety. Her ability to manage her own negative affect is then carried over into her ability to manage her infant's negative affect.

Other research has taken a cognitive approach in examining antecedents of attachment. One scale of the AAI addresses metacognition (or reflective-self function), which taps the ability to understand the intentionality of others. Fonagy et al. (1991) found that persons willing and able to reflect on the motives and intentions of their parents and themselves (in the present as well as reflecting back on childhood) are more likely to be classified as securely attached. Their findings suggest that coherency on the AAI is actually a measure of reflective-self function and that the transmission of attachment has much to do with the ability of parents to understand their infants' mental world. The reflective-self function plays a key role in parenting. By definition, maternal sensitivity necessitates the ability to reflect on the infant's mental state and to respond appropriately. An effective caregiver must be able to contain the affect of the infant, anticipate psychological as well as physical needs, and adapt their responses as well as the external environment to meet those needs.

Coherency is the strongest factor on the AAI that predicts attachment classification, but what exactly does this scale measure? As stated, coherency requires the ability to reflect on mental states, but also involves emotion regulation. Bretherton (1990) suggests that open communication between caregiver and infant allows an infant to form coherent internal representations. A study that examined narrative construction found that narrative coherency, although a cognitive and linguistic component of narrative construction, is closely related to emotion regulation. In order to produce a logical sequence of events, participants had to maintain cognitive organization while coping with emotional story stems. Some critics have argued that the AAI assesses

something more akin to current psychological state than to early experiences. This author would argue that perhaps the AAI measures narrative coherency, which, in turn, requires some degree of ability to regulate emotion.

In addition to maternal characteristics, several infant characteristics have been examined. Although many researchers (Belsky & Rovine, 1988; Egeland & Farber, 1984; Gunnar et al., 1989; Vaughn et al., 1989) have not been able to establish a consistent link between infant temperament and attachment, others have. In one study (Seifer et al., 1996), infant temperament was not directly related to infant attachment, but was related to maternal sensitivity. Hence, infant temperament plays a role through its interaction with maternal sensitivity. Another study revealed that high sociability at 3 months of age was predictive of avoidant attachment and that high irritability at 6 months was predictive of resistant attachment. The researchers hypothesized that maternal sensitivity predicts security of attachment and that infant temperament predicts the type of insecure attachment. It is most likely that a combination of factors is involved and that an either-or view of causality in regard to maternal sensitivity and infant temperament is too limited.

As previously discussed, distress management has predictive power for attachment classifications in adults. Some have argued that distress management in the infant is more a product of infant temperament than an emergent property of the dyadic relationship. The SS, as the most commonly used measure of infant attachment, was designed to measure behavioral adaptations of infants to a challenging situation. Is it possible that the SS actually does not measure attachment, but measures affect regulation? The SS is

stressful; hence, the skill being measured may simply be the child's ability to self-soothe and/or use the parent to do so upon his or her return. It is possible that the way a child learns to self-soothe is by having it done by a parent. In Del Carmen et al.'s (1993) study, maternal prenatal anxiety was negatively correlated with secure mother-infant attachment status, and the ability to manage distress in the infant was the strongest predictor of secure infant attachment. It is this author's thought that distress management, although not synonymous with attachment, is a large part of what attachment instruments measure.

Analyzing infant temperament and attachment, Vaughn et al. (1992) found that temperament scales that refer to affect regulation accounted for the largest amount of variability. Overall, researchers have failed to find significant relationships between commonly used infant temperament measures and the insecure-secure classifications of the SS (Belsky & Rovine, 1988; Egeland & Farber, 1984; Gunnar et al., 1989; Vaughn et al., 1989; Weber et al., 1986). This is not to say that the characteristics of the child do not play a role in the interaction, but rather that untangling cause from effect may be impossible. The degree of association between measures of attachment and measures of temperament, however, is not strong enough to suggest that they are measuring the same thing. It appears that child behavior and affect regulation both occur in a social context, temperament ratings supplied by a parent will be influenced by their relationship with the child, and the assessment of attachment cannot take place in a temperamental vacuum. Separating attachment and infant temperament is extremely difficult, but the common ground between these two

variables appears to lie in their contribution to emotional development and their ties to affect regulation. Perhaps both temperament and attachment are measuring something more akin to affect regulation.

Other factors certainly play a part in caregivers' relationships to their infants. Secure attachment in a parent is correlated with secure attachment in an infant. To isolate this as a causative factor, however, requires the elimination of confounds (low SES, single parenting, etc). Entry into daycare has been identified as a risk factor for avoidant attachment. A number of confounding variables in researching nonmaternal care exist and are difficult to control for. One study (Barglow et al., 1987) that was able to control for external stressors of low SES and non-intact family, as well as for the quality of substitute care, revealed that insecure attachments were significantly more prevalent among infants receiving substitute care. The researchers concluded that routine separation due to maternal employment that begins in the child's first year of life does not cause, but significantly increases the probability of insecure attachment.

Another factor that may impact attachment is close proximity between infant and caregiver. In a study that experimentally manipulated physical contact, Anisfeld et al. (1990) found that there were significantly more securely attached mother-infant dyads (83%) in the group that used soft infant carriers than in a control group that used infant car seats (38%). Mothers who held their infants more were more responsive to their infants' vocalizations and more sensitive in general. Infants who were carried vocalized alone significantly less, began to smile later, and had less regular periods of crying. These proximity-

promoting behaviors were not needed by carried infants because they were already in close proximity to their mothers. Increased physical contact, although not highly correlated with secure infant attachment, appears to be an intervention that affects both maternal and infant behavior in ways that promote secure attachment.

In the final study reviewed, Sagi et al. (1997) examined unusual sleeping arrangements in two kibbutz settings. The researchers compared infants who received identical substitute care during the day but varied in their sleeping arrangements. Findings revealed a 76% concordance rate between infant attachment and mother attachment classification among infants who slept at home with their parents. Infants who slept in a communal setting had a 40% concordance rate between mother attachment classification and infant attachment status. Maternal attachment was similar in both kibbutz arrangements (65% secure among those in a communal sleeping arrangement, 72% among those in a home-based arrangement), yet the distribution of infant-mother attachment status was diverse (80% secure in the home-based setting, 48% secure in the communal sleeping arrangement). These findings suggest that maternal sensitivity can be overridden by an unfavorable child-rearing situation in which infants must sleep away from home and consequently fail to develop secure attachments.

Conclusions

A number of factors revealed in the studies reviewed can be summarized in several key points. First, six maternal characteristics are strongly associated

with secure infant attachment: (a) secure maternal attachment classification according to the AAI, (b) the desire to have children, (c) a commitment to providing physical and psychological protection for an infant, a willingness to participate in the caregiving role, and less doubt about self, infant, and the attachment relationship, (d) the ability to modulate infant arousal, (e) the ability to manage one's own and the infant's negative emotions, and (f) the ability to reflect on the infant's mental state and understand his or her mental world. These factors, in turn, are linked to several additional factors.

First, in looking at secure maternal attachment status, Fox (1995) speculated that the AAI may actually measure some personality factor other than attachment status. In analyzing the AAI, the strongest single measure for determining attachment classification is coherency (i.e., internal consistency) of the verbatim transcript. This entails the ability to form a coherent narrative while dealing with emotion-laden material (one's relationships with one's caregivers). This ability to maintain cognitive organization is dependent on affect regulation; therefore, the AAI may be measuring the ability to tolerate distress in order to maintain a logical narrative.

Second, the desire to have children is dependent upon one's internal representations of attachment. At the representational level, this involves the commitment to provide physical and psychological protection and the willingness to participate in the attachment relationship. The amount of doubt about oneself as a caregiver is dependent upon the internal representation of self, child, and relationship. These internal representations are most likely formed by either one's actual experience with caregivers or a later

reconstruction of these representations that involves increased psychological insight. The earned-secure attachment classification demonstrates that these internal representations can be reworked and that earned-secure mothers parent with more empathy and sensitivity than did their own parents (Bretherton, 1985; Main & Goldwyn, 1984). This suggests that clinical interventions should be targeted, at least in part, at caregivers' internal representations of themselves in that role.

Third, mothers of secure infants are more capable of modulating their infants' arousal. Bowlby (1969) was the first to suggest that attachment establishes a relationship in which the infant can use the mature brain of the parent to organize its own immature brain's processes. The largest meta-analysis of parental antecedents of infant attachment found the strongest correlations for measures of mutuality ("mother's skill at modulating the baby's arousal, her entertainment style, and her responsiveness to the infant's cues"; de Wolff & van Ijzendoorn, 1997, p. 71), which was the only factor that tapped into the ability to modulate arousal. Bowlby also suggested that parental assistance in reducing negative emotions soothes the child and helps them develop the ability to self-soothe. The assumption is that to have the ability to soothe a child, the mother must first be able to do this for herself. Consequently, a mother who has the ability to manage her own distress will be more likely to be able to manage the distress of her infant.

By definition, the ability to reflect upon the mental state of the infant is necessary for a mother to be sensitive to her infant's cues. The infant's internal world is developmentally very different from that of an adult. A mother must

be able to reflect on her own mental state as well as that of her infant in order to regulate dyadic emotions (i.e., achieve affect attunement). Sensitive mothers are responsive to their children's needs due to their ability to reflect on their infants' mental state, which helps infants modulate affective expression and arousal. Mothers who are low in sensitivity are, therefore, less likely to be effective in helping their children regulate arousal and manage negative affect.

The findings pertaining to infant variables are less clear. Infant temperament variables appear to have an impact on maternal sensitivity, but cannot be directly linked to infant attachment status. Hence, there appear to be interaction effects involved. In the research cited in this paper, infant attachment and temperament, although clearly overlapping characteristics, are not completely redundant. It may be difficult to tease out temperament variables from variables of the dyad. It may, in fact, be as Winnicott stated, "There are no infants, only mother-infant dyads" (1965, p. 57). The common ground between temperament and attachment may lie in the close ties to affect regulation and their contribution to emotional development.

Finally, a number of external or environmental factors can either increase the probability of secure infant attachment or disrupt its transmission. Maternal employment and substitute care have been identified as risk factors for insecure attachment. However, the majority of infants whose mothers work outside the home are securely attached, which suggests that the transmission of attachment is not caused by the mere presence of a caregiver and that daily separations do not mandate insecure attachment. Other studies found that maternal absence (both during the night and during the day) interrupted the transmission of

secure attachment. Although many of these infants were also securely attached, the concordance rate between secure mothers and secure infants was lower for infants who slept away from home at night than for those who were near their mothers. Hence, adverse environmental factors can interrupt the transmission of that secure attachment even with securely attached mothers.

Clinical Implications

The clinical implications of this body of research are quite profound. If secure infant attachment serves as a protective mechanism from later psychological disturbances, early intervention with young mothers and their children may be the most effective form of primary prevention. The question then becomes what is the best way to intervene? Researchers have examined interventions designed for mothers soon after giving birth. Findings suggest the possibility of influencing the mother's parenting and promoting a healthier mother-infant relationship. A meta-analysis of 12 intervention studies (van Ijzendoorn, 1995) showed that it was possible to enhance sensitive responsiveness. The overall effect on parental sensitivity, however, was moderate, and the overall effect on infant attachment was quite modest, which indicates that changing parental behavior toward a child may not impact infant attachment.

The significant correspondence between mothers' mental representations and their infants' attachment status suggests that these behavioral systems are linked at the level of representation. This may provide a mandate for intervention that combines insight-oriented therapy with didactic instruction in

childrearing. Among infants who are disorganized in attachment, this may be particularly relevant. Studies of conduct disorder have revealed a low rate of secure attachment and a high rate of unresolved loss in at least one parent. Main (1991) found that adults with unresolved loss were unable to engage in metacognition or in the reflective process regarding their relationships. Intervening with conduct disordered children, Routh, Hill, Steele, Elliott, and Dewey (1995) found that the insecure and unresolved group showed less change than the secure and resolved group. Unless the unresolved loss is worked through, unresolved mothers may be less able to engage in collaborative activities and may have more difficulty learning new parenting techniques.

Egeland (1993) directed an intervention program aimed at increasing responsivity and sensitivity of high risk mothers toward their infants. Despite the alteration of maternal behavior, no differences were found between this group of women and a control group regarding the number of securely attached infants. Commenting on these negative findings and future direction for intervention programs, Egeland suggested interventions that would allow a woman to discuss her attachment status and her feelings toward her own parents. His thought was that infants' attachment classification could be changed by having their mothers work through attachment feelings toward their own parents. The aim would not be to change the mother's behavior directly, but to intervene indirectly by changing the way she thought about her relationship to her own caregivers. He believed that a mother's behavior toward her infant is a product of the way she views her own attachment relationships, which can be

reconstructed as a function of increased psychological insight. This reorganization of working models can occur with a spouse or therapist who provides a secure base from which one can explore his or her internal world and requires the ability to reflect on one's own mental state as well as the mental state of the caregivers—also a characteristic of secure infants. While reflecting on these mental states, one must also be able to manage negative emotions associated with early attachment relationships. If these capacities are developed, an adult may be able to provide himself or herself with a new interpersonal pattern of relating that will contribute to the construction of a coherent working model or a new interaction schema.

Clinical orientations such as psychoanalytic or object-relations, are based on the premise that maladaptive behavior patterns (e.g., difficulty with parenting) will improve when issues (e.g., childhood experiences) have been processed emotionally. This increased psychological insight allows one to more accurately and realistically appraise current attachment relationships. This is the earned-secure attachment category: those persons who, despite negative childhood experiences, have developed the ability to manage negative emotions, possess increased psychological insight, and have reworked their attachment representations later in life. Studies (e.g., Phelps, Belsky, & Crnic, 1998) exploring earned-secure and continuous-secure parents revealed that earned-secure parents did not repeat problematic parenting patterns. Others studies (e.g., Pearson et al., 1994) have found that coherent thinking about one's own childhood (found in both continuous-secure and earned-secure according to the AAI) was correlated with effective parenting.

In conclusion, confronting and emotionally processing harsh childhood experiences facilitates internal shifts in how attachment information is processed. Interventions aimed at improving parenting among insecurely attached adults may be more effective if they help parents reorganize their own attachment status before implementing didactic interventions. This therapeutic work can also be done long before becoming a parent. Much of the attachment literature that addresses the missing link in the transmission of attachment has assumed that there exists a concrete, but elusive, parental characteristic or behavior that has yet to be discovered. Perhaps this is not the case.

This author postulates that what matters most in cultivating secure attachment is not something one does, but a function of who one is. Adults with earned-secure attachment representations, as well as adults with continuous secure attachment, representations are more likely to have securely attached children. Furthermore, security can be earned through insight-oriented therapy. The journey to secure attachment has many obstacles. One can certainly help parents clear the way of obstacles such as parental absence due to employment and unavailability of the parent during the night, as well as helping parents process unresolved loss, increasing physical contact when appropriate, helping parents view themselves positively in their roles as caregivers, and increasing their parental sensitivity through increasing their insight into their own attachments.

Psychologists do not always see immediate results in their clients. Altering an adult's internal representations of attachment relationships and developing distress management skills take time and are often difficult. Those

courageous enough to undertake the journey can be encouraged by knowing that the work they do will not only improve their own relational abilities, but will impact their children and the generations to come.

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